

Application No.: 10/068, 277

Docket No.: JCLA8620

**REMARKS****Present Status of the Application**

The Office Action rejected all presently-pending claims 1-14. Specifically, the Office Action rejected claims 1 and 6 under 35 U.S.C. 102(b), as being anticipated by McMenamin (ZA 71/7184). The Office Action also rejected claims 1,2, 6-8 and 14 under 35 U.S.C. 103(a) as being unpatentable over McMenamin (ZA 71/7184) in view of applicant's admission of prior art (AAPA). The Office Action rejected claims 3-5 under 35 U.S.C. 103(a), as being unpatentable over McMenamin in view of AAPA and Lin (US 5,668,420). The Office Action rejected claims 9-12 under 35 U.S.C. 103(a), as being unpatentable over McMenamin in view of AAPA, Wong (US 5,756,054), Matsuura (JP 08-126707) and Yen (US 5,426,561). The Office Action rejected claims 13 under 35 U.S.C. 103(a), as being unpatentable over McMenamin in view of AAPA and Foller (US 4,541,989). Applicants have canceled claims 2-5 and amended claims 1, 9 and newly added claims 15-16. No new matter adds through the amendments. After entry of the foregoing amendments, claims 1, 6-16 remain pending in the present application, and reconsideration of those claims is respectfully requested.

**Summary of Applicant's Invention**

The Applicant's invention is directed to an electrolytic process of ozone generation using a coated titanium grid as cathode,  $\beta$ -PbO<sub>2</sub> deposited on a grid as anode. Batteries in conjunction with supercapacitors as a DC power source can be used. No membrane is required to separate the electrodes, and a neutral salt such as NaCl is used to enhance the generation of ozone gas. The electrolytic apparatus may further comprise a bubbler. As batteries can power the ozone generation, the apparatus can be disposed at point-of-use and away from the city electricity. The electrolytic apparatus can be used for sterilization of water for pharmaceutical industry, household water supply, for surface cleaning of semiconductors, meats, fish, fruits, as well as for disinfection of SPA water and personal hygiene.

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**Discussion of Office Action Rejections**

*The Office Action rejected claims 1 and 6 under 35 U.S.C. 102(b), as being anticipated by McMenamin (ZA 71/7184).*

Applicants respectfully traverse the rejections for at least the reasons set forth below. Independent claim 1, as amended, reads as follows:

1. An electrolytic cell for ozone generation, comprising:  
two grid electrodes immersed in an electrolyte, the two grid electrodes being powered by a DC power source continuously or intermittently, wherein  
the electrolyte comprises at least one neutral salt;  
a first electrode of the two grid electrodes is an anode, *wherein a material of the anode comprises titanium coated with another material selected from the group consisting of platinum, iridium oxide and tin oxide, and a layer of  $\beta$ -PbO<sub>2</sub> is coated on the anode,* and  
a second electrode of the two grid electrodes is a cathode, *wherein a material of the cathode comprises titanium coated with another material selected from the group consisting of platinum, iridium oxide, and tin oxide.*

McMenamin discloses an apparatus for purifying water including a stainless steel mesh anode 14, a platinum mesh cathode and a plastic mesh 16 separating the cathode and anode (Fig 1). However, in claim 1 of this application, the material of the anode comprises titanium coated with another material selected from the group consisting of platinum, iridium oxide and tin oxide, *and a layer of  $\beta$ -PbO<sub>2</sub> is coated on the anode.* Material of the cathode comprises titanium coated with another material selected from the group consisting of platinum, iridium oxide, and tin oxide. Furthermore, McMenamin teaches that his apparatus is used to purifying water by generating oxygen at anode. McMenamin is totally silent about generating ozone.

Hence, the electrolytic cell of claim 1 is different from the apparatus disclosed in McMenamin, and cannot be anticipated by McMenamin.

*The Office Action also rejected claims 1,2, 6-8 and 14 under 35 U.S.C. 103(a) as being unpatentable over McMenamin (ZA 71/7184) in view of AAPA. The Office Action also rejected claims 3-5 under 35 U.S.C. 103(a), as being unpatentable over McMenamin in view of AAPA and Lin (US 5,668,420).*

Claim 1 has been amended to include the contents of claims 2-5.

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The Office Action acknowledged that McMenemy does not teach a  $\beta$ -PbO<sub>2</sub> coating on the surface of the anode, but relied on applicant admitted prior art (AAPA) in the specification (paragraph No. 4) of the present application to show that a  $\beta$ -PbO<sub>2</sub> anode is known in ozone generation. The Office Action acknowledged that McMenemy does not teach making the anode and cathode from titanium coated with a material such as platinum, iridium oxide or tin oxide, but relied on Lin to teach electrodes made of titanium coated with iridium oxide.

Applicant respectfully traverses the rejection for at least the reasons discussed below.

Although AAPA of the application describes the use of a stable material with high oxygen overpotential such as  $\beta$ -PbO<sub>2</sub> as anode for ozone generation. AAPA does not teach or suggest that  $\beta$ -PbO<sub>2</sub> is coated on core material of an anode.

Lin teaches a magnetohydrodynamic (MHD) thruster for driving a ship. Although electrodes are used in the MHD thruster, Lin's invention has nothing to do with generating ozone. It is believed that Lin's invention is directed to a non-analogous art.

The attention of Examiner is most respectfully directed to the decision *In re Clay* (CAFC 1992) 966 F2d 656, 23 USPQ2d 1058, which found that a combination of references is improper if one of the references is non-analogous art. Applicant respectfully urges that the art of generating ozone and the art of generating power to drive a ship are clearly non-analogous. As stated in *Clay*:

Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference is still reasonably pertinent to the particular problem with which the inventor is involved.

Applicant most respectfully submits that because the generation of ozone using electrodes and the generation of power (driving the flow of seawater) are clearly not in the same field of endeavor. Thus, the first criterion has been met.

With respect to the second criterion, it is clear that the Lin's invention has nothing to do with the generation of ozone and, thus, is not at all pertinent to the particular problem with which applicant is involved.

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Furthermore, there is no suggestion or motivation to combine Lin with McMenamin. The only suggestion to combine the various features from the cited references comes from the applicant's specification and claims.

Therefore, the combination of Lin with McMenamin is untenable and cannot support a rejection under 35 U.S.C. § 103(a).

In addition, the present invention performs the electrolysis at ambient temperature (claim 14) without the need of a membrane to separate the electrodes. However, McMenamin requires a plastic mesh to separating the cathode and the anode.

For at least the foregoing reasons, Applicant respectfully submits that independent claim 1, as amended, patently define over the cited prior art references, and should be allowed. For at least the same reasons, its dependent claims 6-14 patently define over the prior art as well.

Additionally, the used current range in Mcmenamin's reference is between 50 and 150 milliamps (page 3, line 7). The current used in the electrolyte cell in the application is about 0.28 to 3.10 A (as new added claim 15) that is described in the specification (page 13, table I). The current in the range of mA of Mcmenamin's reference is insufficient to produce ozone. Moreover, the electrolyte in Mcmenamin's reference includes HCl to maintain the pH at about 6.8-7.4 (page 2, line 23 and page3, line12). However, no acid is required in the application.

*The Office Action also rejected claims 9-12 under 35 U.S.C. 103(a), as being unpatentable over McMenamin in view of AAPA and further in view of Wong (US 5,756,054) with support form Matsuura (JP 08-126707), and Yen (US 5,426,561).*

Wong, Matsuura, and Yen clearly cannot cure the deficiencies of McMenamin regarding the electrodes. Therefore, claim 1 as amended is patentable over McMenamin in view of AAPA and further in view of Wong, Matsuura, and Yen. Claims 9-12 depend from claim 1 and, thus, are also patentable for a least the same reasons.

Furthermore, Wong teaches the generation of ozone using liquid oxygen and electron gun (col 3, lines 19-25) at 10 to 200 kilovolts (col. 6, lines 11-12). The aforementioned process is a corona discharge rather than the electrolytic production of ozone as the Office Action described. The oscillator of claim 9 of the application contains a circuitry comprising a power circuit, a switching circuit, and self-excited multi-level oscillation circuit, which is different from the

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Matsuura's simple DC-DC converter. There is no connection between Matsuura's diagram and circuitry of the application. Moreover, Yen has shown an ultracapacitor without expressing that it is useful for improving pulse power devices.

*The Office Action rejected claim 13 under 35 U.S.C. 103(a), as being unpatentable over McMenamin in view of AAPA and further in view of Foller (US 4,541,989).*

Foller clearly cannot cure the deficiencies of McMenamin regarding the electrodes. Therefore, claim 1 as amended is patentable over McMenamin in view of AAPA and further in view of Foller. Claim 13 depend from claim 1 and, thus, is also patentable for a least the same reasons.

Furthermore, Foller uses a tubular air cathode wherein air is provided to bubble through the electrolyte to dilute ozone formed at the anode (col. 3, lines 5-13). In contrast, the application uses a bubbler to create air bubbles for enhancing the production of ozone. Thus, different design and different purpose exist between Foller's reference and the application.

#### New Claims

New claims 15 and 16 depend, directly or indirectly, on claim 1 and, thus, they are patentable over the prior art for reasons discussed above.

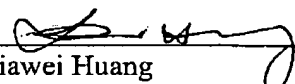
#### CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims 1, 6-16 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,  
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